Messrs. Geo. Newnes, Ltd., will add to their Library of Useful Stories :—"The Story of the Alphabet," by Edward Clodd, illustrated ; "The Story of Bird Life," by W. P. Pycraft, illustrated ; "The Story of Thought and Feeling," by F. Ryland.

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Mr. Fisher Unwin gives notice of :—"In Birdland with Field Glass and Camera," by Oliver G. Pike, illustrated.

Messrs. Whittaker and Co.'s announcements are :—"Wireless Telegraphy and Hertzian Waves," by S. R. Bottone ; "English and American Lathes," by J. G. Horner ; "Electric Wiring Tables," by W. Perren Maycock ; "Electrical Engineers' Pocket Book," by Kenelm Edgcumbe ; "Inspection of Railway Material," by G. R. Bodmer ; and new editions of "British Locomotives, by C. J. Bowen Cooke ; and "The Atlantic Ferry," by A. J. Maginnis.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

A GRANT of 100*l.* has been made to Prof. Schafer from the Earl of Moray Endowment Fund, by the Edinburgh University Court, for purposes of original research.

ANOTHER Bill to establish a University of the United States has been introduced into the Senate. It proposes that University Square, recently occupied by the old U.S. naval observatory, be the site for the national observatory.

MR. W. E. PLUMMER, the director of the Bidston Observatory, Liverpool, under the control of the Dock Board, has been elected to an Honorary Readership in Astronomy at University College, Liverpool. The appointment has given equal satisfaction in the college and the city. It recognises Mr. Plummer's devoted and efficient service as a teacher, and the distinguished position he has attained in scientific observation and research. Without any violation of confidence, it may be said that his claims to such a recognition were cordially supported by some of the most distinguished astronomers in the kingdom.

SPEAKING at Derby on March 12, at the distribution of prizes to students of the Municipal Technical College, Sir William Abney, K.C.B., referred to the fact that at the end of this month the Department of Science and Art will come to an end. It will be merged in a department to be known as the Board of Education, which is to supervise all kinds of education—elementary, secondary and technological. He remarked : In the Queen's Speech they were promised that there should be an Education Bill introduced, reorganising the authorities for secondary education. The introduction of such a bill marked a great advance in public opinion as to the necessity of local co-ordination of the kind in question. Speaking in his private capacity, and not officially, he hoped that not only would secondary education be under a local authority, which would supervise it and look after its interests, but that all other education would be similarly managed.

Mr. R. HEDGER WALLACE is entitled to speak with authority upon the subject of "Agricultural Education in Greater Britain," and his paper, published in the *Journal* of the Society of Arts of March 9, admirably summarises what is being done for agricultural education in our colonies and dependencies. The facts stated by Mr. Wallace in his survey afford sufficient evidence to justify the following conclusions :—First, that throughout Greater Britian, irrespective of climatic, racial and political divergences, there is a universal movement to give all interested in the culture of land every opportunity, facility and assistance possible to improve themselves, their art and craft, and the land and its produce. Secondly, that the purely educational or teaching facilities in agriculture offered by other portions of the Empire where the general agricultural conditions are somewhat akin to our own are not only so distributed as to cover fairly the area in question, but are also equal in educational value to any of the agricultural training or teaching institutions in this or the other countries of Europe.

THOUGH University College, Bristol, has not so many generous friends as some of the other provincial colleges of the same rank, the report of the Council shows that it not only continues to impart the highest kind of instruction in the arts and sciences, but also assists in extending the bounds of existing knowledge by means of research. As evidence of the original work carried on during the session 1898-99, an extract is given from the report of the faculty of arts and science. Among the subjects of researches mentioned are :—the physical properties of some hydrocarbons, properties of metal films, velocity of ions in non-conducting liquids, chemical composition of foods, mass of the ions in the silent electric discharge from points, the mammalian remains discovered in the Uphill Caves, and the relation of stimulus to sensation in visual impressions, involving a modification of the Weber-Fechner formula. Original work is the most valuable testimony to the efficiency of a University College ; it prevents the members of the staff from falling into merely stereotyped methods of teaching, it is a valuable example and incentive to students, and it serves to make the college known as a centre of intellectual endeavour. Compared with former years, the college was exceptionally fortunate during the session covered by the present report, for it received a legacy of 5000*l.* from the late Mr. Stuckey Lean, and an anonymous donation of 1000*l.*, as well as a generous legacy of scientific books from the late Mr. J. T. Exley, who also bequeathed to the college his collection of scientific apparatus. The council are looking forward with confidence to the newly-established Colston Society, which has for its object the endowment of Colston Chairs in connection with the college, or the assistance of the Institution in such other manner as the committee of the society may approve. It is to be hoped that the promotion of the cause of higher education in Bristol in this manner will receive the strong support of all classes of citizens. The president of the college, the Lord Bishop of Hereford, has been elected first president of the society.

THE following announcements from recent numbers of *Science* show that natural knowledge has many liberal friends in the United States :—Mr. John D. Rockefeller has given 100,000 dollars to Columbia University to endow the chair of psychology. Mr. Andrew Carnegie has given 300,000 dollars to Cooper Union, New York City, and 200,000 dollars has been contributed by Abram S. Hewitt and Mr. Edward Cooper ; this will enable the Union to establish courses in mechanic arts. Syracuse University receives 25,000 dollars by the will of the late Mr. Erastus F. Holden, of Syracuse ; the bequest will be used for the department of astronomy and for the observatory. Oberlin College receives 75,000 dollars by the will of the late Mrs. Caroline E. Haskell, of Michigan City, Indiana ; and 40,000 dollars by the will of the late William Osborne, of Pittsburg. By provision of the will of the late Dr. John Stanford Sayre, Princeton University will receive 40,000 dollars, part of which is for the endowment of fellowships in applied chemistry and in applied electricity. President Schurman has announced an anonymous gift of 80,000 dollars for Cornell University to erect a building for physiology and anatomy. By a decision of the New York Court of Appeal, Yale University will receive the 150,000 dollars bequeathed by William Lampson. President Bashford, of the Ohio Wesleyan University, announces that Mrs. Elizabeth Mebarry, of Richmond, Ind., who recently gave 50,000 dollars to the University, has added 10,000 dollars to the fund, thus endowing two chairs. By the will of the late

Dorman B. Eaton, Columbia University receives 100,000 dollars to found a professorship of municipal science and administration, and Harvard University 100,000 dollars to endow a chair in the science of government. Mr. Louis H. Severance, of New York City, has given 60,000 dollars to Oberlin College for a chemical laboratory. The provision made for the college by Mrs. C. E. Haskell amounts to 77,000 dollars. St. Lawrence University has recently received a gift of 24,000 dollars from a friend of that institution. A half million dollars will be distributed by Dr. D. K. Pearsons, of Chicago, among fourteen colleges throughout the United States. Most of his donations will be made on condition that the colleges raise a certain amount, generally 50,000 dollars, or an amount equal to the gift, within a given time. Dr. Pearsons has already given 2,500,000 dollars to the cause of education.

SCIENTIFIC SERIALS.

Transactions of the American Mathematical Society, January. —At the February meeting of the Society last year, the President announced that the Council had reported that it was "desirable and feasible, and in all respects for the best interests of mathematical science in this country, that the Society should undertake the periodical publication of *Transactions*, beginning with January 1, 1900." The well-printed and altogether admirable first part is now before us, and we heartily wish good speed to the venture, "the success of which is already well assured." The size of the page is approximately 11×8 inches, and so is intermediate between the *Bulletin* and *American Journal of Mathematics* pages.—Conics and cubics connected with a plane cubic by certain co-variant relations, by H. S. White, is a paper which was read, with a slightly different title, at the August (1899) meeting. By employing the irrationality that occurs in Hesse's canonical form of the cubic, the writer is able to identify Hilbert's two systems of irrational co-variant conics, and to exhibit certain other relations, and thence to give explicitly co-variant equations of definition for the two cubics which have the same Hessian, and for those which have the same Cayleyan, as a given fundamental cubic. The results are attained by the aid of a canonical form of the cubic containing Hesse's irrationality. The conics discussed are Hilbert's co-variant conics (*cf.* letter addressed to M. Hermite, Liouville, vol. iv. 1888). The invariantive proofs of some of the foregoing results are given in the next paper, Formentheoretische entwickelung der in Herrn White's Abhandlung über curven dritter ordnung enthaltenen Sätze, by Paul Gordan.—Sur la définition générale des fonctions analytique, d'après Cauchy, by E. Goursat, has its object thus indicated.—J'ai reconnu depuis longtemps que la démonstration du théorème de Cauchy, que j'ai donné en 1883, ne suffisait pas la continuité de la dérivée. Pour répondre au désir qui m'a été exprimé par M. le Professeur W. F. Osgood, je vais indiquer ici rapidement comment on peut faire cette extension. —On a class of particular solutions of the problem of four bodies, by F. R. Moulton, treats the case of three bodies finite, moving in *circles* according to one or the other of the solutions of Lagrange, while the fourth is infinitesimal.—Definition of the Abelian, the two hypo-Abelian, and related linear groups as quotient groups of the groups of isomorphisms of certain elementary groups, by Dr. L. E. Dickson, aims at giving a natural definition of these groups based upon Jordan's "important, but artificial, conception of *exposants d'échange*." It is written in the author's usual thorough style.—H. Maschke gives a half-page note on the unilateral surface of Mœbius.—On regular singular points of linear differential equations of the second order whose coefficients are not necessarily analytic, by M. Bôcher. The writer remarks that since the time of Cauchy it has been considered of interest to establish the existence of solutions of differential equations whose coefficients are functions of a real variable x, and to do this without requiring these coefficients to be analytic functions of x, but merely continuous functions. It is a natural extension of this point of view to wish to investigate the nature of singular points of such equations, *i.e.* of points where the coefficients become discontinuous. It is M. Bôcher's object to carry through such an investigation in a special case, viz. that of

$$\frac{d^2y}{dx^2} + p\frac{dy}{dx} + qy = 0,$$

where the independent variable (x) is real, and p, q are functions of x, which are not required to be analytic.—The elliptic

σ-functions considered as a special case of the hyperelliptic σ-functions, by O. Bolza. This paper has a two-fold object. In the first place it gives a sketch of the theory of the "elliptic" in the light of the theory of the "hyperelliptic" functions; and secondly, it serves as an introduction for a future paper in which an analogous presentation is given of the hyperelliptic σ-functions.—Dr. G. A. Miller writes on the groups which are the direct products of two sub-groups, and E. H. Moore discusses certain crinkly curves (reff. are made to papers by Peano, *Math. Ann.* vol. xxxvi.; Cesàro, *Bulletin des Sciences Math.*, vol. xxi. 1897; Hilbert, *Math. Ann.* vol. xxxviii.). There are several diagrams.—Dr. L. E. Dickson gives a new definition of the general Abelian linear group.—If the high character of the present number is maintained, it is safe to prophesy that the *Transactions* are come to stay.

Bollettino della Società Sismologica Italiana, vol. v. 1899-1900, No. 6.—On seismic registrations of long period, by E. Oddone (see p. 477).—The earthquake of Ventotine on March 27, 1899, and the trometometric records obtained at the Collegio Bianchi, in Naples, and at Reggio di Calabria, by P. G. Costanzo.—Earthquake of Balikesri, in the north-west part of Asia Minor, on September 14, 1896, by G. Agamennone.—Notices of earthquakes recorded in Italy (July 30–October 11, 1898), by A. Cancani, the most important being the earthquakes of Janina on July 31, Calabria-Sicily on August 6 and 12, and Umbria-Marches on August 25 and September 11, and distant earthquakes on September 1, 13 and 22.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, February 22.—"The Ionisation of Dilute Solutions at the Freezing-point." By W. C. D. Whetham, M.A., Fellow of Trinity College, Cambridge.

This paper contains a description of the electrical part of a joint research, by Mr. E. H. Griffiths and the author, on the freezing-points and electrical conductivities of very dilute solutions of the following substances :—Sulphuric acid, potassium chloride, barium chloride, copper sulphate, potassium permanganate, potassium ferricyanide and potassium bichromate. In order to eliminate the effect of dissolved glass, the water used as solvent was distilled in a platinum still and collected in platinum vessels ; a known weight was then placed in a platinum cell, and weighed quantities of stock solution added, in successively increasing amounts. The concentration of the solutions thus prepared was calculated in terms of the number, m, of gram-equivalents of solute dissolved in one thousand grams of solution. In order to control the temperature, the platinum cell was surrounded by a coil of tubing through which evaporated ether vapour could be passed. The whole was surrounded by a brass case fixed in the middle of a large tank filled with broken ice. The walls of the platinum vessel formed one electrode, and a platinum cage suspended within it the other. Inside this cage revolved a platinum tube which contained a thermometer, and also served as the shaft of a screw. This screw kept the contents of the cell at a uniform temperature, and mixed the stock solutions with the liquid previously within the cell. The electrical resistances were measured by the method of alternating currents, the connections of the Wheatstone's bridge with a dry cell and with a D'Arsonval galvanometer being reversed simultaneously by means of a revolving commutator driven by a hand wheel and cord. This arrangement is more convenient and more sensitive than the usual telephone apparatus. The conductivity thus found was corrected for the conductivity of the solvent, and the result, k, divided by m, gave the equivalent conductivity of the solution. Curves were drawn between $\sqrt[3]{m}$ and k/m, and the maximum value of these taken to indicate complete ionisation. The ionisation, a, of the solutions was then calculated by dividing the maximum k/m into its actual value, and new curves were drawn between $\sqrt[3]{m}$ and a. The general form of these curves resembles that of the corresponding ones obtained by Kohlrausch and other observers at 18°, but the slant of the lines is different both from Kohlrausch's observations, and also from new observations made with the present apparatus at 18°. The abnormal type of curve found at 18° for acids and alkalies is shown to appear at 0° in the case of sulphuric acid, the ionisation reaching a maximum as the dilution is increased, and then suddenly becoming much less. Reasons are given for